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RaPiDo

Vision Guided Random Picking for Industrial Robots

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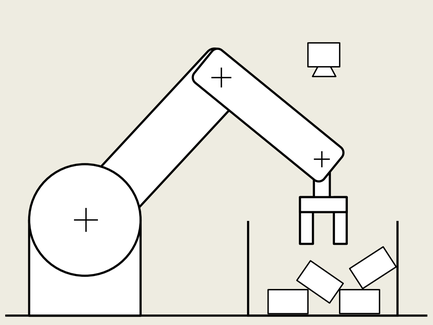
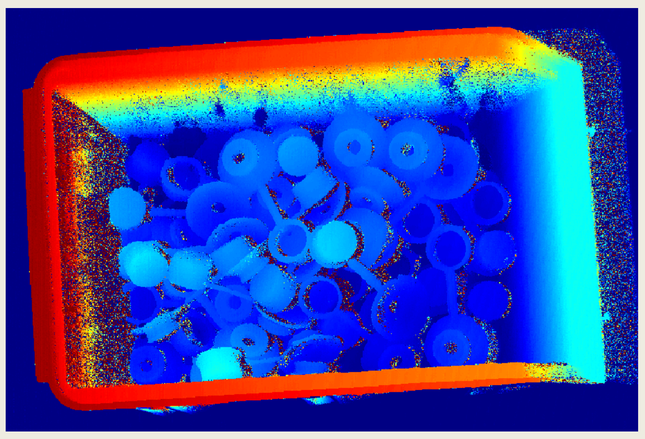
The goal of the RaPiDo project is to enable industrial robots to handle objects that are positioned randomly. There are two important issues that need to be resolved. The first is to detect the object to handle, and measure it's position. The second challenge is to calculate a trajectory the robot can follow towards this object, to pick it up.



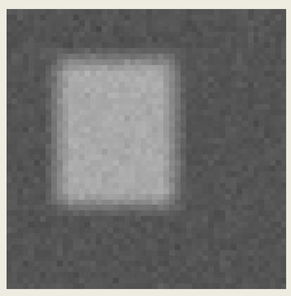
A typical situation in which the location of the objects the robot needs to grab are unknown. They are stacked randomly in a bin.

To localize an object in the scene we need a model of the object. The model can either be available as a technical drawing, or a model can be obtained from images or 3D scans.

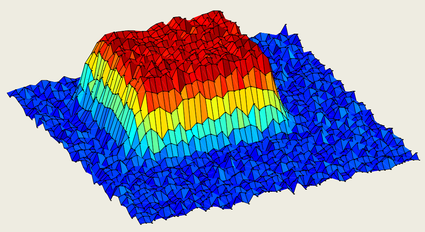


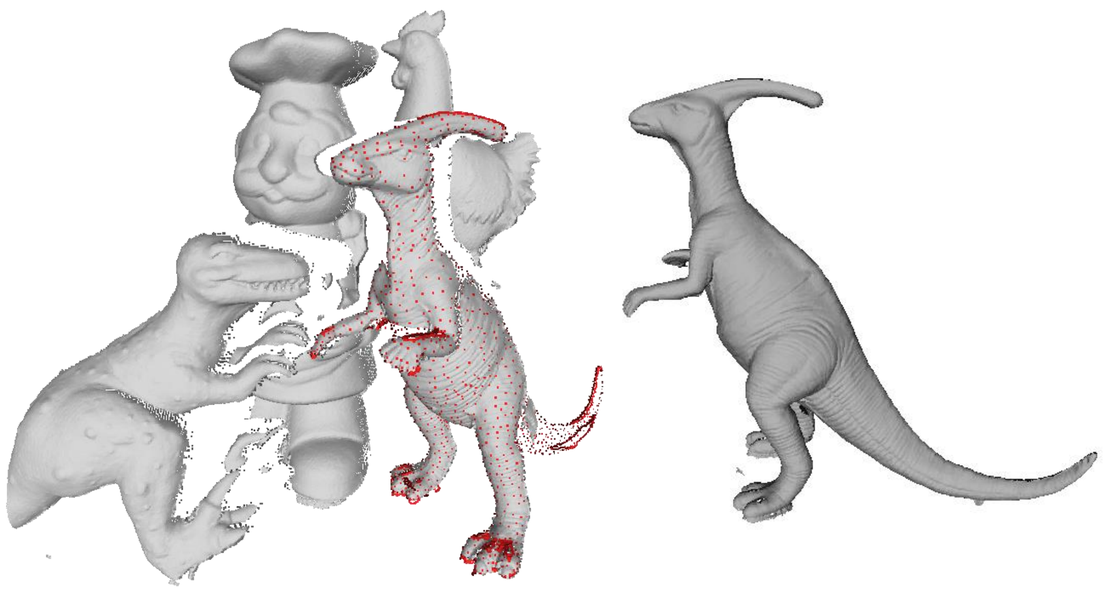
A scan of the scene is made. The next task is to search for the object model. We test and evaluate multiple detection algorithms.

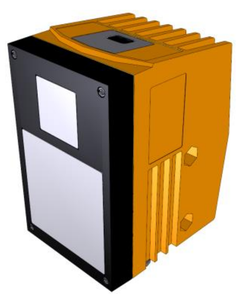
To localize the objects, we use a camera system. An ordinary camera only provides 2D information, which makes it difficult to detect the objects and obtain their 6D pose.



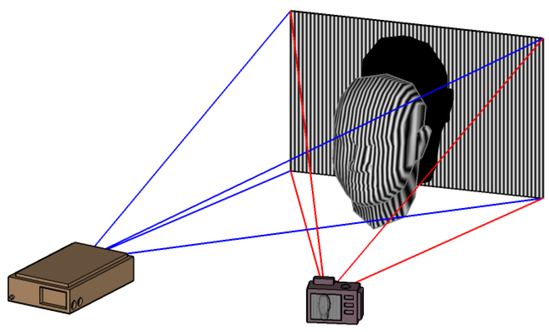
3D camera systems allow us to measure the scene geometry. We test different sensors and assess their performance for our application.



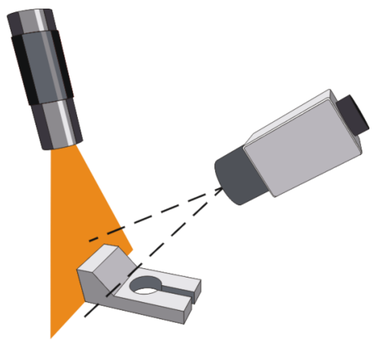




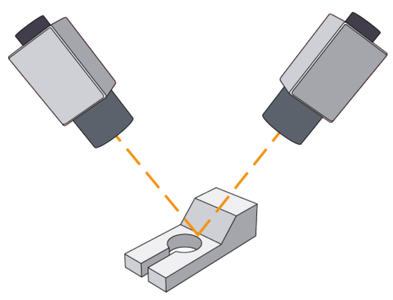
Time-of-Flight camera



Structured Light

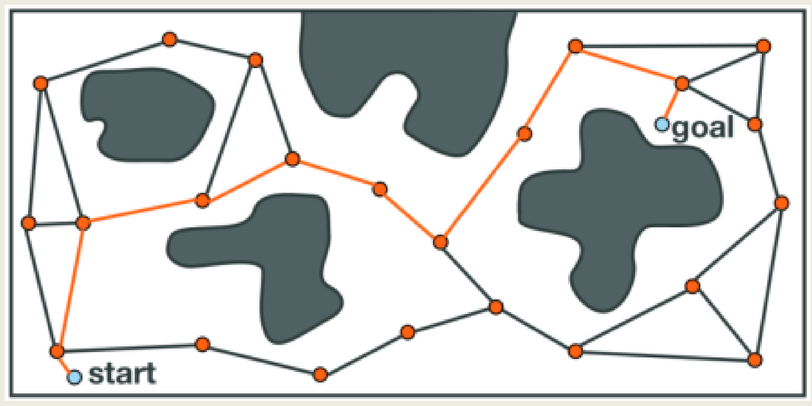


Laser triangulation



Stereo camera

To grasp a detected object (at the 'goal' position), the path along which the robot must move needs to be determined. This is done by classifying the space as either 'free' or 'object'. By planning a path through the free zones, collisions are avoided.



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